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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/599,250

09/22/2006

A. Paul Alivisatos

IB-2018

6259

8076

7590

09/24/2008

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EXAMINER

LE, HOA T

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

09/24/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/599,250	Applicant(s) ALIVISATOS ET AL.	
	Examiner H. T. Le	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>Aug 2007</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 7-12 and 15-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, it is unclear how a shell can be branched and enclosed (required to form a shell). In addition, line 2, "either" should be removed to avoid confusion.

In claims 18-20, it is unclear what "the length" denotes.

Other claims are deemed indefinite in view of their dependency on claim 7.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4 and 7-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Torimoto et al (US 7,381,465).

Claims 1-4: Torimoto teaches a core-shell structure comprising a shell and a nanoparticle inside the shell and a space between the shell and the nanoparticle. See col. 2, lines 54-62. The shell has a thickness that permits passing of solute and solvent (col. 4, lines 3-8) which would necessarily be within 1nm to tens of nm.

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Claims 7-12 and 15-20: See col. 6, lines 52-56.

Claims 13-14: The first material comprises Si and the second material comprises sulfur (S). See col. 7, line 60 to col. 8, line 8. Because they are chemically different, they have different diffusion rate.

Claim 21: Torimoto teaches a method of making a core-shell structure having a void space inside a shell by coating the surface of the core particle with a first component material and reacting the first component material with a second component material to form the shell. See col. 3, lines 27-45.

Claims 22-24: The first material comprises Si and the second material comprises sulfur (S). See col. 7, line 60 to col. 8, line 8. Because they are chemically different, they have different diffusion rate.

Claims 25-27: See col. 3, line 27 to col. 4, line 7.

Claim 28: The nanoparticle is CdS (col. 6, lines 46-50 and col. 7, lines 55-60).

Claim 29: Torimoto teaches that the nanoparticle can be any metal (col. 2, lines 65-66) which encompasses Pt.

Claim 30: Torimoto teaches the application of the core-shell structure for catalysts (col. 1, lines 10-11).

Claim Rejections - 35 USC § 103

4. Claims 5, 6, 29 and 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Torimoto et al (US 7,381,465) as applied to claims 1-4 and 7-30 above, and further in view of the discussion below.

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Claims 5, 6 and 29: Torimoto teaches metal as the material for the particulate nanocore (col. 2, lines 65-66). Platinoid and noble metals are known to be one of the best materials for catalyst. Therefore, one of ordinary skill in the art would have been motivated to select Pt as the metal for the nanoparticle of the core-shell structure of Torimoto.

Claim 31: Thiophene is abundant in petroleum and known to be one of the organic sulfur compounds that are easier to hydrogenolyze; therefore, hydrodesulfurization of thiophenes is the one of the most common hydrodesulfurizations performed in the art. One of ordinary skill in the art would have found it obvious to apply the core-shell catalyst of Torimoto in hydrodesulfurization by contacting with thiophene to remove sulfur from thiophene.

5. Other references are cited as art of interest.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. T. Le whose telephone number is 571-272-1511.

The examiner can normally be reached on 9:30 a.m. to 6:00 p.m., Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on 571-272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. T. Le/
H. (Holly) T. Le
Primary Examiner
Art Unit 1794

September 14, 2008